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(54) Improvements relating to toffee making

(57) A method for the production of toffee in which at least a part of the carbohydrate is supplied in the form of a hydrolysed whey syrup and at least a further part is supplied in the form of a malto-dextrin.

By including malto-dextrin toffee may be made using hydrolysed whey syrup (HWS) but without the taste and texture disadvantages normally associated with the use of HWS.

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SPECIFICATION

Improvements relating to toffee making

This invention relates to an improved process for the manufacture of toffee.

Toffee is a traditional confectionery manufactured for many years using, as one of its major ingredients, sugars of both dairy and non-dairy origin. The sugars of non-dairy origin are usually sucrose and glucose. The sugars of dairy origin are normally lactose introduced in the form of a condensed skimmed milk. The condensed skimmed milk used in toffee manufacture contains lactose but the sweetening power of lactose is relatively low and in order to improve the sweetness of the condensed milk, sucrose is added so that the total sugar content of the sweetened condensed skimmed milk is about 60%.

Large quantities of milk are used in cheese-making processes, the major by-product being a cheese whey. The major component of the solid matter of cheese whey is lactose and the next major component is protein. Until very recently, large quantities of cheese whey was simply discarded or used in animal feedstuff but changing attitudes to environmental pollution and the changing economic climate has encouraged investigation into finding ways of utilising cheese whey in the production of foodstuffs for human consumption. The major problem in the use of cheese whey as a sweetening agent is that the major carbohydrate component is lactose which, as mentioned above, has a relatively low sweetening power, and whey also contains substantial quantities of minerals which means that foodstuffs incorporating the cheese whey acquire a salty taste.

It has been known for many years that lactose can be split enzymatically into its component mono-saccharides, glucose and galactose using the enzyme beta-galactosidase but it is only very recently that such enzymatic cleavages have been possible on the industrial scale necessary for the treatment of cheese whey. Application of this technique to the enzymatic hydrolysis of cheese whey and also to acid whey from casein manufacture has led to the production of a new industrial raw material called hydrolysed whey syrup (HWS). In HWS, a major proportion of the original lactose is hydrolysed to glucose and galactose which have considerably more sweetening power than lactose. Appropriate control of the extent of the hydrolysis therefore makes it possible to produce an HWS containing a mixture of lactose, glucose and galactose such that its sweetening power and total sugar content is very similar to the total sugar content and sweetening power of the lactose and sucrose in the skimmed sweetened condensed milk conventionally used in toffee making. Since the protein and fat content of HWS can be readily adjusted to a similar value to that found in the skimmed sweetened condensed milk and, by partial demineralisation, any tendency to salty taste can be minimised, HWS can be produced having properties very similar to those of skimmed sweetened condensed milk.

It has therefore been proposed to utilise HWS as an alternative to skimmed sweetened condensed milk in the manufacture of toffee and, although, in priciple, such substitution is possible, it was found that the use of HWS gave rise to a more chewy texture, a more well defined flavour and a darker colour than conventional products.

We have new found that HWS can be satisfactorily used to replace part or all of the skimmed sweetened condensed milk in a toffee making recipe without any significant observable change in the character of the resulting toffee if a malto-dextrin is incorporated into the toffee recipe.

Accordingly, the present invention provides a method for the production of toffee in which at least a part of the carbohydrate is supplied in the form of a hydrolysed whey syrup and at least a further part is supplied in the form of a malto-dextrin.

Malto-dextrins are produced by the hydrolysis of polysaccharides, usually maize starch or potato starch. The hydrolysis is carried out, either enzymatically or by acid hydrolysis, of the starch, and the earlier the hydrolysis is stopped, then the lower the dextrose equivalent (D.E.) of the resultant product, and hence the lower the sweetness. Malto-dextrins are classified as products with a dextrose equivalent of less than 20, and are obtainable in a number of grades within this range. They are complex polymers consisting of glucose, maltose and the hither polysaccharides, the exact specification depending on the D.E. value of the malto-dextrin.

In the present invention, we have found it convenient to use a malto-dextrin having a dextrose equivalent (D.E.) of at least 10, the range of at least 15 but less than 20 normally providing the best balance of properties.

We have found that it is desirable to incorporate no more than about 6% by weight malto-dextrin in the toffee recipe since the use of larger amounts of malto-dextrin gives rise to a product that is too sticky to be acceptable. The malto-dextrin, which is less sweet than either sucrose or glucose and gelactose, also helps to balance the sweetness of the final product as the glucose and galactose, obtained in the hydrolysis of the whey, are sweeter than the lactose in the whey. 3% to 5% by weight malto-dextrin normally ensures that the properties of the final toffee are substantially indistinguishable from those obtained preparing toffee traditionally using skimmed sweetened condensed milk.

The HWS used in the present invention can be HWS prepared from any cheese whey (or from acid whey). We have found that the whey used in cheddar cheese making is particularly suitable for our purposes and we prefer to use a hydrolysed whey syrup derived from such cheddar whey in which the syrup contains about 55% to 60% total sugar, the extent of lactose hydrolysis being such that the HWS contains 20% to 25% each of glucose and galactose and about 10% to 15% lactose. Such syrups will have a

sweetening power about 45% that of sucrose which compares well with the sweetening power of skimmed sweetened condensed milk traditionally used in toffee manufacture.

It is also prefferred that the HWS be partially demineralised by treatment with ion exchangers so that the total mineral content of the HWS after treatment is no more than about 3% to 4% of the solids content by weight. The minerals present in the cheese whey and HWS are predominantly calcium, sodium and potassium and these may be removed using cation exchangers of the type acceptable in food processing or by electrodialysis.

The extent to which HWS is to be incorporated into the toffee recipe is very much a matter of individual choice and economics. One of the major advantages of using HWS in toffee manufacture is the relative reduction in raw material costs by the use of HWS compared to the traditional skimmed sweetened condensed milk.

In principle, any amount of the condensed milk up to 100% can be substituted by the HWS, provided that the malto-dextrin is also incorporated in the recipe.

A traditional toffee recipe contains ingredients such as sweetened condensed milk, sucrose, glucose, fat, and colours and flavours. Since the combination of sugars in hydrolysed whey syrup differs from those in sweetened condensed milk, it is necessary to rebalance a recipe in terms of its sugar content when using HWS.

When using hydrolysed whey syrup, the sucrose content is increased, while the glucose syrup is decreased, so as to retain the same balance between mono and di-saccharides.

One of the major fats used in toffee manufacture is hardened (hydrogenated) palm kernel oil (HPKO), which has a melting point of around 32°C. Other fats may be used in place of, or in addition to, HPKO. Butter is often used to give additional flavour, in conjunction with an emulsifier. Margarines and other vegetable oils can be used, those most suitable being ones with a melting point of between 32° and 35°C. Coconut oil and hardened marine oils can be used, but these tend to impart flavours to the finished product.

The following Examples are given to illustrate the invention.

EXAMPLE 1

A conventional toffee is manufactured from the ingredients given below. Modified recipes are also used where HWS is used to replace some of the condensed milk but no malto-dextrin is used and, in accordance with the invention, where half the sweetened condensed skimmed milk is replaced by HWS and malto-dextrin is also used. The proportion of the other carbohydrate ingredients is adjusted to maintain the carbohydrate balance which exists in the conventional recipe.

Ingredients	Conventional recipe weight %	Comparative recipe weight %	Invention recipe weight %
Sweetened condensed skimmed milk	25.2	12.6	12.6
HWS	0	12.6	12.6
Glucose Syrup 42 DE	33.7	29.55	23.3
Sucrose	22.8	28.2	28.2
Hardened Palm Kernel Oil	17.5	17.5	17.5
Malto-dextrin	0	0	5
Salt	0.6	0.6	0.6
Flavour	0.2	0.2	0.2

The composition on weight percent of the HWS and skimmed swetened condensed milk used in this Example are as follows:

Component	HWS	Skimmed Sweetened condensed milk
Protein (Nx6.38)	11	10
Glucose	23	0
Galactose	23	0
Lactose	11.5	14.4
Sucrose	0	46.1
Total sugar	57.6	60.4
Minerals	3	2.3
Fat	1	0.35

The estimated sweetening power of the HWS is 45 compared with sucrose at 100 while that of the skimmed sweetened condensed milk is 47.

The sweetened condensed skimmed milk, hydrolysed whey syrup, (when used) glucose syrup and sucrose are added to the boiling pan. Ingredients are heated to 13°C and premixed for 15 minutes. The fat is melted, and then falt salt and malto-dextrin (when used) are added to the boiling pan. The toffee is then heated to 123°C over a period of 23 minutes, after which time flavour is added. The toffee is poured onto an oiled cooling slab and turned periodically until cool, at which point it is processed, cut and wrapped.

The toffee may also be manufactured on a continuous process by means of suitable plant equipment, where the same recipe can be utilised.

The toffee made with the conventional recipe gave a clear crack at 123°C. The product was a golden brown in colour with a hard, chewy texture. Toffees made with the comparative recipe were a much darker colour, and on storage proved to be far more chewy and elastic. However the colour of the invention recipe toffee was comparable with the conventional recipe sample, and the product became "shorter" with a more defined crack point and a texture similar to the conventional recipe toffee and less chewy than the comparative recipe toffee.

When using hydrolysed whey syrup in a toffee recipe, it can also be used to replace full-cream sweetened condensed milk or to replace sweetened condensed whey with equally successful results, provided malto-dextrin is also used.

CLAIMS

1. A method for the production of toffee in which at least a part of the carbohydrate is supplied in the form of a hydrolysed whey syrup and at least a further part is supplied in the form of a malto-dextrin.

2. A method according to claim 1 wherein the malto-dextrin has a dextrose equivalent of at least 6 but less than 20.

3. A method according to claim 2 wherein the malto-dextrin has a dextrose equivalent of at least 15.

4. A method according to any one of claims 1 to 3 wherein the malto-dextrin represents up to 6% by weight of the total ingredients of the toffee.

5. A method according to claim 4 wherein the malto-dextrin represents from 3% to 5% by weight of the total ingredients of the toffee.

6. A method according to any one of claims 1 to 5 wherein the hydrolysed whey syrup is produced from acid whey.

7. A method according to any one of claims 1 to 5 wherein the hydrolysed whey syrup is produced from cheese whey.

8. A method according to claim 7 wherein the hydrolysed whey syrup is produced from cheddar cheese whey.

9. A method according to claim 8 wherein the hydrolysed whey syrup comprises 55% to 60% total sugar by weight.

10. A method according to claim 9 wherein the hydrolysed whey syrup comprises 20% to 25% of glucose, 20% to 25% of galactose and 10% to 15% of lactose by weight.

11. A method according to any one of claims 1 to 10 wherein the hydrolysed whey syrup has been at least partially demineralised such that the mineral content is from 1% to 9% by weight of total solids.

12. A method according to claim 1 and substantially as herein described with reference to the Invention Recipe of Example 1.

13. A toffee whenever produced by the method of any one of claims 1 to 12.

14. A toffee whenever produced by the method of claim 1 and substantially as herein described with reference to the Invention Recipe of Example 1.

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